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ABSTRACT

This agriculture extension service publication from Pennsylvania State University discusses the control of vertebrate pests of urban and suburban ornamentals and turf. Specific pests described are blackbirds, chipmunks, moles, rabbits, and European starlings. Identification, habits, economic importance, and control methods ranging from poisoning to trapping and frightening are presented. A table of control chemical suggestions indicating repellents, toxicants, and fumigants for the pest species is included. (MR)

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CONTROL OF VERTEBRATE PESTS OF FOREST TREES, ORNAMENTALS, AND TURF
(Revised Copy)

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BLACKBIRDS

Most bird damage to crops is done by red-winged blackbirds and grackles with starlings and brownheaded cowbirds mixed into the foraging flocks. Male RED-WINGED BLACKBIRDS are black with a scarlet shoulder patch, but the females lack this distinctive marking; females are brownish with streaked breasts. GRACKLES are robin-sized with long keel-shaped tails. Adult grackles are iridescent and glossy black; the young are brown. STARLINGS are long-billed, short-tailed, iridescent and glossy black with light-colored speckles over the body. COWBIRDS are relatively small. Males are glossy black with a rich brown head, and the females are grayish brown with a light throat patch.

HABITS

Redwings rear two broods annually in nests in marshes and hayfields. Grackles prefer to live in colonies and to rear their single brood in evergreens, dense thickets, and vines. Starlings nest in hollow trees, bird houses, or other cavities. Cowbirds are parasites; they lay their eggs in other birds' nests, then depend on the other species to hatch and rear the young.

Blackbirds feed extensively on insects, especially during the nesting season, although 5 to 10 percent of their diet consists of corn and other grain. By early July, when small grain is harvested, grackles have completed their nesting and some redwings have finished nesting. By early August, flocks of redwings and grackles are joined by migrants from distant areas, and starlings and cowbirds mix into the large aggregate flocks of blackbirds.

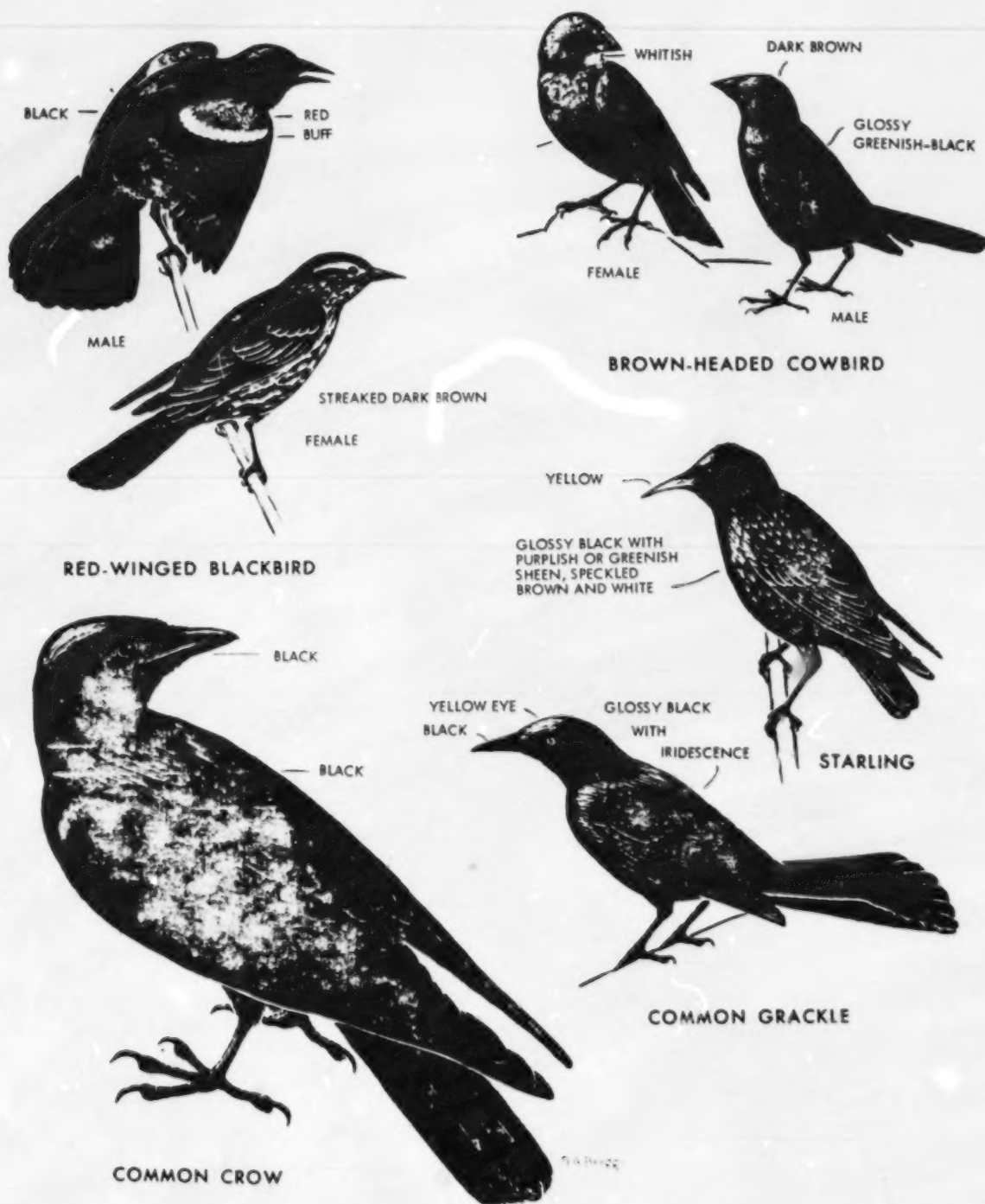
Blackbird flocks make daily flights from their roosts to crop fields, woods, and grassland. At dawn the birds depart in different lines of flight. They may feed as far as 20 miles from their roost. Redwings usually break

into smaller flocks, while grackles tend to stay in large bands throughout the day.

During August, blackbirds damage standing corn from the time it enters the milk stage until harvest. Redwings and grackles tear open the husk and feed on the kernels. The shredded husk shrivels and exposes more kernels. Cowbirds feed on the kernels exposed by the other blackbirds. The opened husk exposes grain to the weather and causes more grain loss.



BIRDS COMMONLY ASSOCIATED WITH AGRICULTURAL CROP DAMAGE



CONTROL

Damage to fruits, vegetables, small grain, and corn may be avoided or reduced by several methods: modified crop culture; changing bird behavior by frightening the flocks; trapping when bird numbers are limited; excluding the birds from susceptible crops; and using pesticides. Usually a combination of methods is superior to a single method.

Cultural Control Methods -- Planting should be coordinated so that most of the susceptible crops in an area enter the vulnerable stage at the same time. Bird damage is greatest in fields near roosts, near nesting cover, or on flight lines. Removing roost cover and substituting less susceptible crops should be considered. Some corn varieties have resistance to bird damage.

Frightening Devices -- Gas exploders, shellcrackers, firecrackers, shotguns, recorded blackbird alarm calls, and electronic sound devices may scare blackbirds from fields. This does not necessarily chase the birds to a nearby crop; the birds may shift to natural food if it is available.

Scare devices should be activated when the crop first becomes susceptible or when blackbirds first begin feeding on the crop. Devices should be used throughout the day but especially during early-morning and late-afternoon feeding periods. Several types of scare devices are better than a single device, and their location should be changed frequently.

Gas exploders are the most commonly used scare devices. Effective range varies with the locale, but usually one exploder is used for every 10 acres. For best results, exploders should be mounted above the height of the crop.

Shotguns using regular ammunition or shellcrackers are effective. The shellcracker discharges a projectile that explodes in the air some distance from the gun. (Use caution with shellcrackers in dry vegetation because of fire hazard.)

Recorded alarm calls and other electronic sounds effectively repel birds, but the equipment is costly.

Trapping -- When limited numbers of blackbirds invade orchards or crops other than corn, traps may help. A bird trapping permit is required. Contact the District Game Protector or Pennsylvania Game Commission, P.O. Box 1567, Harrisburg, Pennsylvania 17120, for information about trap plans and permits.

Excluding blackbirds -- When fruits, vegetables, or other crops in limited areas are attacked by birds, durable netting to cover the crop will effectively keep birds away. This is economically feasible in small areas supporting high-value crops.

Pesticides -- Few pesticides are registered for use against bird damage.

Blackbirds pull sprouting grain and other seeds. Several seed treatment repellents are registered for protection against this damage. Some of these repellent compounds, however, have characteristics that reduce germination.

A pesticide registered for protecting standing corn against blackbirds works on the principle of frightening the flock by the alarm calls of the few birds that eat the toxic bait. Only one percent of the cracked corn bait applied to the field contains the toxicant. Skilled applicators can apply this blackbird pesticide from aircraft when flights are well organized with maps, aerial photographs, and ground coordination with growers in an area. Timing the applications to be made as corn goes into milk-dough stage and as birds first attack the fields is critical. Flying weather may present limitations. Calibration of the proper amount of material to apply should be done using untreated grain of the same size as the commercially treated bait. Field edges should not be treated.

During winter, many blackbirds migrate south, but some wintering flocks remain in Pennsylvania. Starlings usually predominate in these winter flocks; some grackles, brown-headed cowbirds, and a few redwings are also present. Lack of readily available food forces the birds to be scavengers. Livestock feed lots and poultry operations with open food supplies are often invaded by winter starling and blackbird flocks. A toxicant pesticide for these two special-use locations--feedlots and poultry operations--can effectively reduce the starling problem. Observations of time, locations, and feeding patterns should be made to aid in placement of treated bait and to determine that no protected birds are present. This toxicant must be placed in feeding stations or scattered on solid areas to which the birds have access, but from which livestock and poultry are excluded.

The starlings will not die on the spot; most birds die at their roosts or along flight lines to the feeding areas.

Prebaiting the area may be necessary for successful use of this material. Do not re-treat before three days have passed because birds receiving a lethal dose may require that much time for the pesticide to be effective.

If protected birds may be endangered or question of hazard occurs, consult local wildlife authorities before using this bird control method.

EASTERN CHIPMUNKS

IDENTIFICATION AND DISTRIBUTION

Chipmunks are small ground-dwelling rodents with distinctive colorful strips on their general rusty-red to chestnut-brown fur. Five dark-brown stripes line the back--one down the backbone from neck to rump, two on each side from shoulder to rump. A creamy-buff stripe separates the dark side stripes. Mature chipmunks are nine to ten inches in length and weigh about three ounces. The flattened, well-haired tail is roughly one-third the animal's total length.



Chipmunks have forefeet adapted for holding and eating food while they sit upright. Their heads are blunt and squirrel-like and have unique furred cheek pouches in which they carry food and other material. The front teeth are chisel-shaped. Chipmunks may range over an acre, but their individual territories often are much smaller.

Chipmunks are omnivorous; they feed on both plants and animals. Plant material such as acorns, hickory nuts, beechnuts, cherry seeds, Juneberries, raspberries, dogwood seeds, corn, and plant bulbs are favorites. The main animal foods are birds' eggs, insects, snails, and occasionally mice and young birds.

Chipmunks spend much time in late summer and fall gathering and storing food. Hard foods are stuffed into their cheek pouches and stored in food caches. They climb shrubs and trees to look for food and to escape enemies.

ECONOMIC IMPORTANCE

In their woodland habitat, chipmunks compete with and complement the natural community of plants and animals. Chipmunks may compete for food with gray, red, and flying squirrels and with grouse, turkey, deer, white-footed mice, and other mast-eating animals. When they store excessive amounts, they remove seeds which might be used by other wildlife, or which would germinate into new plants. Chipmunks compete in a predatory way when they eat birds' eggs or nestlings.

When chipmunks move into an urban setting they may conflict with man. In their normal activities, they may dig seeds from the garden, feed on flower bulbs, and burrow into dry rock walls. If the homeowner places a higher value on his garden or flowers than on seeing chipmunks, reductional measures are needed to offset the conflict.

If chipmunks enter homes, their external parasites may be potential public health hazards.

REDUCTIONAL MEASURES

Homes with wooded lots, thickets of ornamental shrubbery, and dry rock walls are very attractive to chipmunks. This habitat can be made less attractive to the animals by altering the pattern of natural and ornamental plantings. However, most people value their trees and shrubs too highly for drastic modification of the landscape, and may opt to tolerate the chipmunks as a part of the natural community.

Chipmunks are not protected. They may be trapped at any season, and shot wherever it is safe and legal to use appropriate firearms. All game laws must be observed when dealing with chipmunks.

Live trapping with small commercial or homemade box traps can reduce their numbers. Once trapped, they may be released away from the area of disturbance.

Use rat-sized snap traps for dead trapping. Baits attractive to chipmunks include peanut butter, nut meats, sunflower seeds, and rolled oats. Place either type of trap in areas where chipmunks travel or feed.

Chipmunks will occasionally enter homes where they are generally more bothersome than destructive. Their entry can be prevented by closing holes in foundation walls and screening windows, vents, and other ground-level openings.

Chipmunk numbers can be reduced locally. However, new animals may move into vacated habitats. Thus, chipmunks can seldom be eliminated from an area unless their living conditions are radically changed.

MOLES

IDENTIFICATION AND HABITS

Moles are small animals that spend most of their lives in underground burrows. They are somewhat similar in appearance and size to shrews and meadow mice and may occupy the same habitat. They are seldom seen by humans; when seen, they are frequently mistaken for mice or shrews.



The most conspicuous features of the mole are the greatly enlarged paddle-like forefeet and prominent toenails, which enable the mole to literally swim through the soil. The legs are strong, the neck short, and the head elongated. Ears and eyes are so small that at first glance they appear to be missing.

A mole's fur is soft and velvety. It varies from black to brownish and grayish with silver highlights. When brushed, the fur offers no resistance in either direction; this enables the mole to travel either backward or forward within his burrows.

Moles may be found in woodland, grassland, wetland, and lawns. They construct extensive underground passageways--shallow surface tunnels for spring, summer, and fall, and deep permanent tunnels for winter use. Nest cavities, about 6 inches in diameter and lined with vegetation, are located from 12 to 18 inches beneath the soil surface connecting with the deep tunnels.

Three species of moles live in Pennsylvania--the eastern mole, the hairy-tailed mole, and the star-nosed mole. The eastern mole, distinguished by its short naked tail, is common in southeastern Pennsylvania, except in the mountains. The hairy-tailed mole has a tail covered with bristly hairs, and is common in the northern and western parts of the Commonwealth. The star-nosed mole has a long snout with a fringe of 22 bare fleshy growths which form a star-like nasal disc on its tip. No other small animal has such a facial characteristic. The tail on the star-nosed mole is relatively long (about three inches) and swells with fat when food is plentiful. The fat is utilized when food becomes scarce. The star-nosed mole may be found over most of the Commonwealth in poorly drained, moist, or marshy areas.

Moles have high energy requirements and are active and feeding day and night at all times of the year. They feed on insects--mature and larvae--snails, spiders, small vertebrates, earthworms, and small amounts of vegetation. Captive moles have been reported to eat more than their own weight in 24 hours.

Moles prefer loose, sandy loam soils which are easy to dig in. They generally avoid heavy, dry, clay soils. They may make extensive runway systems in a surprisingly short time. Mole activity in lawns or fields usually shows up as ridges of upheaved soil created where the runways were constructed as the animals moved about foraging for food. Some of these tunnels are used as travel lanes; others may be abandoned immediately after being dug. Mounds of soil (molehills) may be brought to the surface of the ground as moles dig deep, permanent tunnels and nest cavities.

Moles breed in late winter (February to April) and have a gestation period of about four to six weeks. Single annual litters of two to five young (usually four) are born in April or May. Young moles are born naked and helpless, but growth and development is rapid. About four weeks after birth, they leave the nest and fend for themselves.

Natural enemies of moles are hawks, owls, skunks, weasels, foxes, snakes, cats, and dogs. For reasons that are not clear (possibly odor), some predators will kill but not eat moles. The star-nosed mole, which often spends considerable time in water, may be eaten by predatory fish.

ECONOMIC IMPORTANCE

Moles in the natural environment cause little damage. They are seldom noticed until their tunneling activity becomes apparent on lawns, gardens, golf courses, pastures, or other grass and turf areas. Star-nosed moles, with their preference for wet, marshy sites, rarely become nuisances.

The upheaved ridges of mole tunnels make mowing lawns difficult. Since the roots are disturbed, grass may turn brown and unsightly. Moles do not eat grass roots, flower bulbs, ornamental shrubs, or other vegetative material while tunneling, but plants may be physically disturbed as moles tunnel in search of animal organisms in the soil. Mole activity may indirectly damage vegetation, but their feeding on insects and other soil organisms has beneficial effects. Moles digging surface and deep tunnels loosen, mix, and in other ways, benefit soil development.

Shrews and meadow mice frequently use mole tunnels as runways and travel lanes. Shrews, like moles, are insectivorous and eat very little vegetation. Meadow mice eat a wide variety of vegetative matter and may cause damage to plant life. The general similarity in color and appearance of moles, shrews, and meadow mice and their tendency to associate in the same habitat and runways make it essential to understand differences in their habits and to know how to identify each species in the event it becomes necessary to control them.

REDUCTIONAL MEASURES

Changing environment -- Moles may be prevented from becoming established or may be controlled once they start digging tunnels by reducing their insect food supply. While this method may take time to become effective, its benefits will persist as long as the animal organisms on which moles feed are kept at a low level. Some insecticides are toxic to all forms of animal life, including man. This should be considered when planning to control soil insects. When used according to the directions on the insecticide label, chemical soil treatment can provide a safe and satisfactory solution to mole damage. Insecticide formulations may change as newer, safer, and more effective materials are developed.

Trapping -- Limited populations of moles may be satisfactorily handled by using specially designed traps. The harpoon-or prong-type trap is available through farm and garden supply stores or hardware stores. Directions for using these special traps are furnished by the manufacturers.

The selection of actively used runways is important for successful trapping. To determine active runways, press down short sections of the raised ridges and mark these locations. Active runways will be repaired as moles continue to feed and travel, while abandoned tunnels will not be repaired. Set traps only at the active locations, and move traps within three days if you fail to catch moles. Time, patience, and knowledge of mole activity is essential to successful trapping.

Fumigants -- Gassing burrow systems with fumigants is complicated. The extensiveness of the burrows and their surface locations, which often causes leakage, makes it difficult to fill all tunnels, runways, and nest cavities with lethal amounts of gas.

RABBITS

Cottontail rabbits are important game animals. However, in small, localized areas, rabbits may damage farm and garden crops during the summer. In winter, they turn to tree nurseries, orchards, and ornamental shrubs. It is at these times that rabbit control may be necessary.

HABITAT CONTROL

Cottontail rabbits prefer dense thickets or heavily vegetated areas in which to live. Cover of this type is necessary for food and for protection from predators. Overgrown ditch banks, brushy fence rows, or brush piles adjacent to croplands, nurseries, or orchards may be major factors contributing to rabbit damage. Rabbits leave this cover at night or early morning, feed in crop areas, and return to the thicket for protection during the day.

Mowing, brush cutting, and general cleanup of overgrown areas may be all that is needed for rabbit control. Without sufficient cover, rabbits do not stay.

TRAPPING

Live trapping may be an effective means of removing individual animals causing damage to gardens or other crops. Although rabbits are active at any time of day or night, they are most active just before sunrise and just after sunset. While rabbits do not usually have definite trails, there may be one or two places where rabbits regularly travel. Areas showing constant rabbit activity or damage are the logical places to set live traps. (Rabbits are game animals; therefore, State Game Protectors of the Pennsylvania Game Commission should be consulted before trapping.) Metal live traps may be purchased from some stores.

HUNTING

In areas with a high rabbit population and a history of damage, heavy hunting should be encouraged to reduce the damage potential.

FENCING

Rabbit-proof fences will help protect small areas of valuable crops during the growing season. Generally, a 2- to 4-foot fence of 1- to 1 1/2-inch galvanized mesh wire is a sufficient barrier. This type of fence must be thoroughly staked to the ground, or the bottom edge buried to a depth of 6 inches, to prevent rabbits from crawling or digging under.

TREE GUARDS

Tree trunk guards also are effective in preventing rabbit damage to trees or shrubs. These guards should be of a material heavy enough to prevent rabbits from chewing through. Tree guards are also available from several commercial sources.

REPELLENTS

Application of repellents may reduce rabbit damage. When properly applied, repellents make treated plants less desirable as food. Three factors determine the effectiveness of a repellent: thoroughness of application; weather conditions; and proximity of existing rabbit food and cover. The application must be heavy enough to withstand adverse weather conditions, because frequent rains and snows erode and dilute the material from treated plants and reduce the amount of protection the repellent offers. Repellent applications are divided into two general classes: winter, or dormant season applications; and summer, or growing season applications.

All bark and twigs must be treated to a height that rabbits might reach during the heaviest snow accumulation. The trunk and all terminal growth in the area must be treated completely. Winter repellent formulations have a much greater repellent concentration than do summer formulations. Application should be made in the fall prior to snowfall.

Summer treatments are similar to those of winter. However, it is necessary to treat more frequently in order to cover new growth.

EUROPEAN STARLINGS

HABITS AND DESCRIPTION

The European starling is a stocky, short-tailed, black bird slightly smaller than a robin. In summer, the adult starling has iridescent black plumage, a long, sharp, yellow bill, and dark eyes. As winter approaches, small, buff-colored spots appear in the feathers, and the bill darkens. This coloration is maintained through mid-winter, and the spots gradually fade away. The young starlings are plain brownish-gray with a dark bill, but assume the typical adult winter plumage by fall. In flight, the greatly tapered, pointed wings give the bird a triangular appearance. The flight is swift and straight--not undulating like that of native blackbirds.



Mated pairs of adult starlings begin nesting in cavities such as tree hollows, woodpecker holes, bird houses, or building crevices by mid-April. In cities, several pairs may nest as a small colony in eaves, roofs, and other structures. In general, starlings nest earlier than most native birds.

The nest is constructed of stiff, fibrous material lined with fine grass and soft material. The female lays three to eight pale greenish-blue eggs. The eggs hatch in about 12 days, and the young remain in the nest for two to three weeks. Once the young can leave the nest, they join together in flocks of gradually increasing size. The adults, however, usually re-nest and produce another brood in late July and August. A third brood may be produced in early November.

With the approach of winter, adults and young gather in large flocks that forage widely and often associate with other blackbirds, especially in the large night roosts. These roosts generally are maintained throughout the winter but begin to break up with the spring mating season. The late-hatched young remain in flocks longest.

Starlings eat almost anything and are highly adaptive in their food selection. These birds devour large amounts of insects, especially grubs, caterpillars, and grasshoppers. (They are especially efficient in probing soil for grubs.) The nestlings are fed almost exclusively on insects. Starlings are also fond of fruit, especially grapes and cherries, and will eat weed seeds and grain in season. In the winter when the ground is frozen or covered with snow, starlings will eat livestock feeds.

During the nesting season, the starling is an aggressive bird. They will often take over a nesting cavity already occupied, evict the occupants and build their own nest. After nesting, much of this individual aggressiveness abates with formation of large flocks.

Starling flocks are highly cohesive. Apparently each bird yields part of his individual identity to the larger flock identity, thus allowing the flock to bank, turn, and twist without apparent leadership or signal.

This same cohesiveness gives the flock the combined experience of its members. The arrangement may also be vital because--as biologists have noted--if the winter flocks are broken up, the individuals frequently cannot maintain themselves separately, and they die, especially during cold weather.

The starling is a constant companion of man because man inadvertently provides most of its requirements. In cities, man's fertilized lawns and parks provide excellent places for starlings to probe for grubs; his waste offers food; his buildings are excellent winter roosting places; and in the country, man's mono-cropping provides abundant food in the crops themselves or in the insects they harbor.

The starling has a variety of whistles and rasping, squeaking calls, some of which are quite harsh. It is a clever mimic, however, and can imitate the robin, killdeer, bobwhite, cardinal, and other birds.

SOCIAL AND ECONOMIC IMPORTANCE

The starling has a bad reputation. City dwellers generally dislike the bird because of its noisy, messy, winter roosts on city buildings. Not only is the roost obnoxious to ear, eyes, and nose, but the birds are known to carry contagious diseases, such as encephalitis, ornithosis, and histoplasmosis. Rural residents dislike the birds because they damage fruit and vegetable crops. (In vegetable crops, however, the starling is often only a secondary invader, continuing the damage started by grackles.) Feedlots attract starling flocks, too. Starlings not only consume large amounts of poultry, hog and cattle feed, but also spread and carry diseases of livestock. Starlings are known to be involved in transmission of hog cholera and other diseases of swine.

GENERAL CONTROL CONSIDERATIONS

It is important to remember at all times that starlings are highly mobile, very cautious, and are capable of learned response. Thus, control procedures must be applied at a time when the birds are vulnerable, at a place at which they frequently congregate, and by a method they cannot easily recognize.

Before using any control measure, consult local laws on bird control, the use of avicides, and the use of noise devices. Starlings are not protected by state or federal laws.

Traps -- Starling traps sometimes produce good results in feedlots, crop fields, and fruit areas, but traps require effort and time to be placed and tended properly. Contact District Game Protector, Pennsylvania Game Commission, for trap plans and permits for trapping.

Crop Fields -- Frightening devices, such as exploders, firecrackers, and commercial scare devices, used correctly offer a reasonable solution for moving starling flocks away from potential damage or nuisance situations in crop fields. Seed treatment repellents may be considered for highly specialized situations.

Buildings -- Making building modifications to prevent entrance and roosting is a long-term solution to the problem. This approach is usually the most satisfactory, even though initially expensive. In specialized roosting circumstances, the use of sticky repellents may be considered.

Roosts -- Starlings will use two types of roosts during the year. The first type is the summer roost, which the birds use during July, August, and September. This is the most common type of roost. It usually contains less than 20,000 birds, is no more than 20 acres in size, and frequently is located in wooded areas adjacent to towns. Summer roost sites used by starlings usually include the following characteristics:

(1) Maple is the favored tree species. These are usually young trees, growing in dense stands, 35 to 45 feet tall and from four to six inches in diameter.

(2) The roost site is usually open and free of understory.

(3) The tree canopy is very dense with many small branches for perching.

Scare devices are usually very successful in moving birds from this type of roost. The key to success in moving summer starling roosts is to start early in the summer before the roost has become firmly established. Starlings have usually finished the first nesting and have begun to establish roosts by July.

The following equipment will be needed to deal with summer roosts: A portable record or tape player with loudspeaker; a record or tape of a starling distress call; two 12-gauge shotguns with four boxes of ammunition (7 1/2 shot); three boxes of exploding shotgun shells (cracker shells), or two automatic exploders.

The operation will require three people for three consecutive nights and should begin one-half hour before sunset. One man will play the starling-distress-call record. It should be played for five minutes at one location and then moved approximately 100 to 150 yards to a new location in the roost. The remaining two men will handle the shotguns. Before entering the roost, starlings gather at a staging area that is usually not more than one-half mile from the roost. Shooters should fire exploding shotgun shells at the incoming flocks as they move from the staging area to the roost, in an effort to turn the flocks back. As the birds begin roosting, the gunners should switch to Number 7 1/2 shot. While exploding shells frighten starlings, the effectiveness is greater if some starlings are killed.

In residential areas where the discharging of firearms is prohibited, shotguns may be replaced by automatic carbide exploders. These should be continued until one hour after sunset.

No significant reduction in the number of starlings is usually seen at the end of the first night. However, fewer birds will return to the roost on the second evening. Regardless of the size of the original roosting flock, fewer than 50 birds should be left at the roost by the end of the third night. At this time the operation should cease.

The second type of roost is the winter roost, which is used by starlings from October through March. This type is commonly located on buildings in cities, under bridges and in dense stands of coniferous trees; it may contain one-half million birds or more. Scare devices are not effective on large winter roosts.

Livestock feed lots and poultry operations -- A difficult problem in starling control at livestock operations is determining where to bait the birds. Each starling flock has a preference for time of feeding, place of feeding, and favored type of food material. The treated bait must resemble the regular feed, and it must be placed where the starlings will find and accept it. Since the birds normally eat from the feed trough, the treated bait must be placed near, but must be inaccessible to the livestock.

CONTROL OF VERTEBRATE PESTS OF FOREST TREES, ORNAMENTALS, AND TURF
CHEMICAL SUGGESTIONS

All chemicals listed are from the EPA Compendium of Registered Pesticides, Volume IV, and Supplements 1 and 2.

<u>SPECIES</u>	<u>REPELLENTS</u>	<u>TOXICANTS</u>	<u>FUMICANTS</u>	<u>COMMENTS</u>
BLACKBIRDS	captan turpentine water gas tar	Avitrol Starlicide		
CHIPMUNKS	thiram			
MOLES	thiram paradichloro- benzene		calcium cyanide gas cartridges*	
RABBITS	blood naphthalene nicotine thiram ziram			Game animal--see Game Law
STARLINGS, EUROPEAN	sticky compounds naphthalene turpentine	Avitrol Starlicide		

*Gas cartridges are mixtures of: carbon, lead oxide, mineral oil, phosphorous, potassium nitrate, sodium chlorate, sodium fluoride, sodium fluosilicate, sodium nitrate, sulfur.

Native birds are protected by both state and federal laws. The European starling and the English sparrow, both introduced birds, have no legal protection.

Three species--the ring-necked pheasant, mourning dove, and the crow--are protected during much of the year but may be legally taken during open gunning seasons established by the Pennsylvania Game Commission. These birds occasionally cause agricultural damage when they feed on newly planted grain. This sort of depredation may be lessened by treating the seeds with registered bird repellents.

No toxicants are registered for dealing with problem game birds.

While depredations permits are required under federal law for dealing with most species of birds, 50 Code of Federal Regulations 21.43 states, "A federal permit shall not be required to control yellow-headed, red-winged, tri-colored red-winged, and Brewer's blackbirds, cowbirds, all grackles, crows, and magpies when found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance."

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